Evaluating CNN Layers Given Emotional Stimuli for FFA Mapping

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Abstract

Logic and reasoning are integral parts of human cognition, but so is emotion. Convolutional neural networks have their foundation in cognitive science and neuroscience. Particularly, the different regions of the brain that serve different purposes. It has been noted that the progression of layers in a convolutional neural network map to the ventral visual stream. In human brains, we have specific cortical regions that can detect individual faces and the emotion that they present. I hope to use a list of emotionally relevant stimuli to pass into a trained ResNet50 CNN model and evaluate how well this model does at representing emotions using the facial imagery shown in images. I will also look at the different layers to see if the model is sensitive to the stimuli at certain layers. Since humans most notably process faces at the fusiform face area in the brain, I will be most interested in finding the ResNet50 equivalent of this area and evaluate if the different types of stimuli are represented differently for this layer.

**Keywords:** FFA; CNN; ResNet50;

# Understanding The Human Ventral Visual Stream

The basis of this paper explores how select models for computing produce similar patterns shown in human neural pathways. It is important to note the patterns that have evolved in human brains first, to understand what exactly we are looking for.

The ventral visual stream is also known as the “what” pathway in humans. It is responsible for processing visual input from the eyes, first processed from the ganglion cells in the retina. Then, the information is sent to the primary visual cortex, which is responsible for initial processing, which detects edges, lines, and other basic stimuli. Then, the secondary visual cortex integrates information from the primary visual cortex and is able to detect more complex patterns like texture and contours. The tertiary visual cortex is able to

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Table 1: Sample table title.

| Error type | Example |
| --- | --- |
| Take smaller | 63 - 44 = 21 |
| Always borrow | 96 - 42 = 34 |
| 0 - N = N | 70 - 47 = 37 |
| 0 - N = 0 | 70 - 47 = 30 |

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CoGNiTiVe ScIeNcE

Figure 1: This is a figure.

# Acknowledgments

In the **initial submission**, please **do not include acknowledgements**, to preserve anonymity. In the **final submission**, **place acknowledgments** (including funding information) in a section **at the end of the paper**.

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1. Sample of the first footnote. [↑](#footnote-ref-1)
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